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ABSTRACT

Research has shown that many behaviors previously thought to be purely psychological in origin do, in fact, have a physiological basis. To examine the relationship of smoking behavior to locus of control, and to attitudes toward, knowledge about, and behavior with respect to nutrition, 116 Canadian undergraduate students completed the Nutrition Questionnaire (consisting of attitude, knowledge, and behavior scales, and miscellaneous questions) and Rotter's Locus of Control Scale. Contrary to expectations, heavy smokers were found to be significantly more internal than either non-smokers or light smokers. No differences between smoking behavior and nutritional knowledge were found, but females were significantly more knowledgeable about nutrition than males. Females also responded more positively to the pro-nutrition factors of the Nutrition Attitude Scale. Caffeine and alcohol consumption were positively associated with smoking behavior and age. No sex differences in caffeine and alcohol consumption emerged. The findings suggest that with age such habits acquire increasing self-acceptance. (JAC)

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ATTITUDES TOWARD NUTRITION, LOCUS OF CONTROL AND SMOKING BEHAVIOR

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ABSTRACT

This study examined the relationship of smoking behavior to locus of control, and to attitudes toward, knowledge about, and behavior with respect to nutrition. In accord with some previous research, it was predicted that smokers would be more external than non-smokers and, based on a pilot study, it was predicted that smokers would possess less nutritional knowledge than non-smokers. Undergraduate students completed the Nutrition Questionnaire and the Locus of Control Scale. Contrary to expectations, heavy smokers were found to be significantly more internal than either non-smokers or light smokers. No differences between smoking behavior and nutritional knowledge were found, but females were found to be significantly more knowledgeable about nutrition than males. Females also responded more positively to the pro-nutrition factors of the Nutrition Attitude Scale. Caffeine and alcohol consumption were found to be positively associated with smoking behavior and age. The results are compared to earlier research. They indicate that the Nutrition Questionnaire is a useful instrument.

In recent years there has been increasing interest in physiological variables as they impinge on psycho-social functioning. It is now well accepted that many behaviors previously thought to be purely psychological in origin do, in fact, have a physiological basis. Work on the relationship between neurotransmitters and their effect on behavior, and on specific nutrients as precursors of neurotransmitters nicely demonstrate the relevance of nutrition to behavior. One consequence is the notion that nutritional variables may have more importance in psychological functioning than previously thought. Yet very little is known about attitudes toward nutrition, knowledge about nutrition, or the effect of either on behavior with respect to nutrition.

Some studies have been done to assess the dietary status of populations such as low income rural families in Iowa and North Carolina (Inano, Pringle and Little, 1975). Similarly, Canada conducted a national nutritional survey in 1973. These are examples of one kind of study which has been carried out.

A few other studies exist. For example, Sims (1976) found that mothers of preschool children who were most knowledgeable about nutrition had higher socioeconomic status and were younger. Schafer (1970) found that women who had a positive self-concept tended to have better quality diets than women with poor self-concepts.

With this dearth of information in mind, a Nutrition Questionnaire was constructed by the senior author. It consists of an Attitude Scale, a Knowledge Scale, and a Behavior Scale. A fourth section contains some miscellaneous questions.

A factor analysis of the 14 questions in the attitude section revealed four factors. Factor I is characterized by an enthusiastic endorsement of nutrition. The perceived benefits in this factor are related to physical appearance and well-being on a feeling level. This appears to be the affective component of a pro-nutritional attitude. Factor II is characterized by an examination of the cost (time, effort, and expense) involved in nutrition. The perceived benefits in this factor are related to health. This appears to be the cognitive element in a pro-nutritional attitude. Factor III is characterized by a response to external cues, such as taste and appearance of foods. This factor is largely neutral towards nutrition. Factor IV is negative toward nutrition. It is characterized by the view that concern with nutrition is only a fad, and with strong disagreement towards the desirability of taking nutritional supplements. These factors indicate that the individual's attitudes toward nutrition can be highly polarized (favourable or unfavourable) or relatively unpolarized (neutral).

It was suspected that pro-nutritional attitudes would be implicated in greater nutritional knowledge and behavior. In an effort to find such a relationship smokers and nonsmokers were compared. In this pilot study 30 male and female undergraduate students ranging in age from 18 to 35 were tested. This sample included 17 smokers (subjects who had smoked regularly for the preceding year), seven never-smokers (subjects who had smoked less than ten cigarettes in their life time), and six ex-smokers (subjects who had previously smoked regularly, but had not smoked during the preceding year). Subjects were known to the experimenters. Smokers were found to be significantly different from nonsmokers in their knowledge about nutrition. Smokers had the least nutritional knowledge, the never smokers were intermediate, and the ex-

smokers had the most knowledge about nutrition. No significant differences were found on the Attitude or Behavior Scales. These findings seemed sufficiently interesting to pursue this matter. Since we suspected we had a biased sample in the pilot study and sample size was small, it was decided to conduct a more rigorous study with smokers and nonsmokers.

In reviewing the literature on smoking, a number of studies were found relating smokers to Rotter's Internal-External Locus of Control Scale, and it was decided to include this variable as well. Research has shown that smokers tend to have more external expectancies than nonsmokers. James, Woodriff and Werner (1965) reasoned that externals would be more likely to start smoking than internals due to their greater susceptibility to external pressures, such as peer groups or advertisements. They found that both male and female smokers tended to be more external. Schwebel and Kaemmerer (1977) replicated the James et al. study and again found that smokers were more external in beliefs. Hielle and Clouser (1970) found female smokers to be more external than female nonsmokers.

The research related to the Locus of Control Scale has shown that internals are more likely to seek information or engage in behaviors in areas that they value. Gochman (1971), for instance, found in children between the ages of seven and eighteen that internals engage in adaptive health related activities and have health perceptions of vulnerability to health problems. He also found that if health is rated highly, perceived control is inversely related to perceived vulnerability. He concluded that internal control interacts with health motivation in relation to health beliefs. In a related study, Sonstrom and Walker

(1973) found that 78% of between group variance was accounted for by internal control with favourable attitudes toward physical activity. In addition, Seeman and Evans (1962) found differential learning between internals and externals in hospitalized tuberculosis patients. Those patients characterized as externals had less objective knowledge about their condition.

The present study was conducted to examine Locus of Control and attitudes toward, knowledge about, and behavior with respect to nutrition in smokers and nonsmokers. The following hypotheses were examined in this study: It was hypothesized that smokers would be more external than never-smokers and ex-smokers, which is in line with research mentioned earlier. It was also expected that smokers would be less knowledgeable about nutrition than nonsmokers as was found in our pilot study. In addition, it was anticipated that attitudes toward nutrition would be neutral or negative in smokers, but have a greater tendency to be positive in never-smokers and especially in ex-smokers. This suggestion was based on findings that internals are more likely to engage in adaptive health related activities (Gochman, 1971) and that externals tend to have less objective knowledge about their condition (Seemon and Evans, 1962). Finally, it was expected that behavior would not differ across groups in our sample of undergraduates since students tend to eat at the same coffee shops and university food outlets.

Method

Subjects were 116 students (55 males and 61 females) from two under-graduate psychology classes at the University of Calgary.

The Nutrition Questionnaire and Rotter's forced-choice, 23 item Locus of Control Scale (I-E scale) were administered to subjects during class time. Subjects were not required to identify themselves on the questionnaires.

Results

The sample included 72 non-smokers (had not smoked more than ten cigarettes in their lifetime), 16 light smokers (smoked less than 10 cigarettes a day), 19 heavy smokers (more than 10 cigarettes a day), and five subjects who had formerly smoked regularly but had stopped for at least a year. It was decided to drop the ex-smokers from the sample because the number was so small. Four subjects with missing data were also dropped from the analysis, leaving a total of 107.

A 2 (male, female) x 2 (17-20 years of age, 25-35 years of age) x 3 (non-smoker, light smoker, heavy smoker) multivariate analysis of variance (MANOVA) and subsequent univariate analyses of variance (ANOVAS) were conducted on the variables. These variables included the I-E scale, indices of caffeine and alcohol consumption, and from the Nutrition Questionnaire four factor scores from the attitude scale and the knowledge and behavior scores.

Smoking Behavior

The main effect for smoking behavior was significant on these measures ($F(18,174.0) = 4.78$, $p < .001$). Subsequent univariate analyses produced three significant values. Scores from the I-E scale were found to be significant ($F(2,95) = 3.91$, $p < .02$). Contrary to the hypothesis based on earlier research heavy smokers were significantly more internal than either non-smokers or light smokers. Smoking behavior was found to be strongly related to caffeine and alcohol consumption. Heavy smokers consume

significantly more caffeine than light smokers and both consume more than non-smokers ($F(2,95) = 27.82$, $p < .001$). Similarly, in the case of alcohol consumption, heavy smokers consume significantly more than light smokers and both consume more than non-smokers ($F(2,95) = 13.32$, $p < .001$). These means are contained in Table 1.

Sex

A main effect was found on the sex factor ($F(9,87) = 2.09$, $p < .05$). The univariate ANOVAS performed on the nine measures yielded significant values for three of the Nutrition Questionnaire scores. A sex difference was found on the knowledge scale of the Nutrition Questionnaire ($F(1,95) = 4.66$, $p < .05$). Females were found to be more knowledgeable about nutrition than males. Factor I of the attitude scale of the Nutrition Questionnaire also produced a sex difference ($F(1,95) = 7.93$, $p < .005$). Females were more enthusiastic than males about the value of good nutrition. There was a significant sex difference on Factor II of the attitude scale as well ($F(1,95) = 5.41$, $p < .02$). Females were more positive than males on this positive factor. The means for the sex differences are shown in Table 2.

Age

The main effect for age was significant on these measure ($F(9,87) = 3.42$, $p < .001$). Subsequent univariate analyses produced four significant values on these measures. Factor II produced significant differences on the age factor ($F(1,95) = 4.81$, $p < .05$). Subjects who were 21-35 years of age scored significantly higher on this pro-nutrition factor than the subjects in the younger age category. There was also a significant difference on the I-E scale between the two age categories

($F(1,95) = 10.81$, $p < .001$). Subjects 17-20 years of age were significantly more external than those 21-35 years of age.

The age factor also produced significant differences on the amount of caffeine and alcohol consumed. Subjects 21-35 years of age were significantly higher in caffeine consumption than subjects 17-20 years of age ($F(1,95) = 4.42$, $p < .05$). The same pattern maintained for alcohol consumption, with subjects in the older age category consuming more than those in the younger age category ($F(1,95) = 5.96$, $p < .02$). The means may be seen in Table 3.

It is of interest to note that over 70% of the students take vitamins at least once a month, while almost a third take them daily. While no significant differences exist between smokers and non-smokers, there was a large sex difference. Among males, 81% take vitamins at least once a month, while only 61% of females take vitamins.

Discussion and Conclusions

While the Nutrition Questionnaire did not produce any significant relations on smoking behavior, a number of interesting findings emerged on sex and age. Females were found to be more knowledgeable about nutrition than males. This difference probably results from women's traditional interest in and responsibility for food preparation, and the fact that they are more likely to enroll in nutrition-related courses. This tendency to be more knowledgeable is also reflected in the more positive attitudes of females toward the value of good nutrition which were found in the study. However, despite the fact that males were less knowledgeable about and had less positive attitudes toward nutrition than females, more males than females tested were taking vitamins at least occasionally. The reason for

this apparent inconsistency is not apparent from this study. The finding that older subjects have more positive attitudes about nutrition than younger subjects may be the result of their greater accumulated experience. Thus acquired knowledge again appears to be related to these attitudes.

As suggested earlier, Factor I of the attitude scale appears to represent the affective component of a positive attitude while Factor II may represent the cognitive component of a positive attitude. The fact that females were significantly more positive on both of these factors may indicate that since the attitudes of males are not more negative on this topic they may simply be less well developed.

The findings with respect to the I-E scale are not consistent with most earlier studies which found smokers to be more external than non-smokers. On the other hand, Lefcourt (1965) and Foss (1973) found no relationship between smoking and the I-E scale. In the present study a reverse relationship was found with heavy smokers being more internal than either light smokers or non-smokers.

Foss argues that there is no logical reason to expect a relationship between Locus of Control and smoking behavior. He believes the critical relationship would be between Locus of Control and continuation of smoking behavior subsequent to exposure to health hazard warnings. Since the health hazards of smoking have been the focus of a great deal of attention in recent years, it is not unreasonable to assume that all educated smokers would be aware of the health risks involved in smoking. Thus in the 1980's smoking behavior and smoking behavior following exposure to health hazard warnings would seem to be synonomous.

Why diametrically opposed results should be obtained with Canadian students as compared to students at American universities is not clear.

However, it is almost 20 years since these studies were done, and the possibility exists that changes in the Locus of Control of reinforcement of students have occurred.

Strong associations were found between caffeine and alcohol consumption and smoking behavior. Heavy smokers are the highest consumers of both substances. This finding is in line with earlier research which indicates that smoking is associated with greater use of psychotropic agents (Straits & Sechrest, 1963; Greden, Proctor & Victor, 1981). Older subjects consume larger quantities of caffeine and alcohol than younger subjects. This is partly related to the fact that most heavy smokers were in the older age category. This finding suggests that with age such habits acquire increasing self-acceptance. No sex differences in caffeine and alcohol consumption emerged.

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Table 1

Means and Standard Deviations for

Dependent Measures by Smoking Behavior

Dependent Variable	Non-Smokers N = 72		Light Smokers N = 16		Heavy Smokers N = 17		Multivariate Analysis of Variance
	M	S.D.	M	S.D.	M	S.D.	F
Caffeine	121.0	121.6	266.6	210.6	606.6	636.8	27.82**
Alcohol	26.68	27.48	58.31	42.80	69.68	56.32	13.32**
Behavior	57.62	8.17	57.25	8.99	59.42	8.38	0.41
Knowledge	10.31	2.94	10.63	3.81	10.42	3.75	0.07
Factor I	18.06	4.32	16.31	3.86	17.63	4.66	1.20
Factor II	15.60	2.67	14.88	3.05	15.63	4.14	0.46
Factor III	3.94	2.08	4.50	1.46	3.68	1.95	0.76
Factor IV	4.82	1.68	4.88	1.71	4.42	2.41	0.38
Locus of Control	10.33	4.20	10.56	2.92	7.74	2.68	3.91*

* $P < .05$. ** $p < .001$.

Table 2

Means and Standard Deviations for

Dependent Measures by Sex

Dependent Variable	Females N = 55 M	Females N = 55 S.D.	Males N = 52 M	Males N = 52 S.D.	F
Caffeine	260.7	284.7	195.4	398.4	1.78
Alcohol	34.02	41.52	44.37	38.86	2.19
Behavior	58.73	8.38	57.00	8.15	1.17
Knowledge	11.02	3.34	9.69	2.93	4.66*
Factor I	18.80	4.08	16.58	4.31	7.93**
Factor II	16.11	3.00	14.85	2.91	5.41*
Factor III	3.67	1.65	4.31	2.24	2.70
Factor IV	4.47	1.55	5.06	2.04	2.65
Locus of Control	10.42	3.80	9.37	3.98	2.12

* $p < .05$ ** $p < .01$

Table 3

Means and Standard Deviations for

Dependent Measures by Age

Dependent Variables	17 - 20 yrs. N = 58		21 - 35 yrs. N = 49		F
	M	S.D.	M	S.D.	
Caffeine	181.6	377.2	285.0	295.6	4.42*
Alcohol	31.21	30.72	48.33	48.17	5.96**
Behavior	57.02	8.57	58.92	7.89	1.41
Knowledge	10.45	3.26	10.29	3.17	0.07
Factor I	17.28	4.41	18.24	4.19	1.50
Factor II	14.95	2.88	16.14	3.06	4.81*
Factor III	4.12	2.02	3.82	1.92	0.62
Factor IV	4.81	1.82	4.69	1.84	0.10
Locus of Control	11.00	3.87	8.61	3.58	10.81***

* $p < .05$. ** $p < .02$. *** $p < .002$.